SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution

Coimbatore-35

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Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

19ITT204 - MICROCONTROLLER AND EMBEDDED SYSTEMS

II YEAR/ IV SEMESTER

UNIT V EMBEDDED SYSTEM DEVELOPMENT

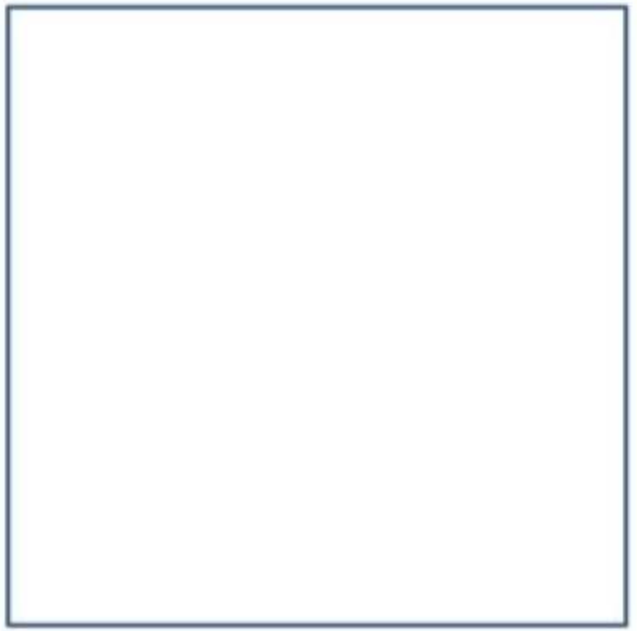
TOPIC – Elevator Controller

The Elevator Problem

- There is a building of several floors and several elevators.
- There are also users that want to use the elevators.

User interaction

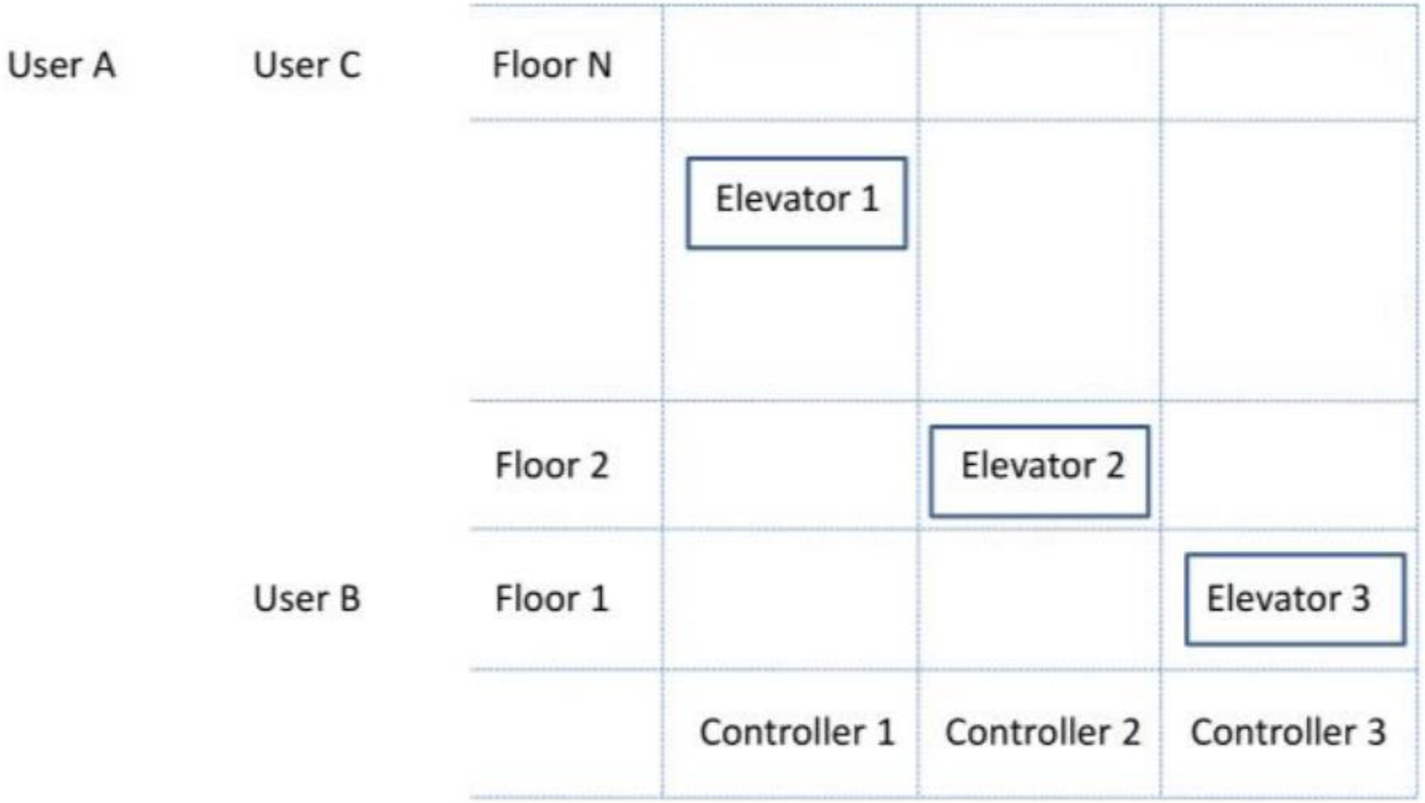
- The user can be outside the elevator and waits for the elevator to arrive.



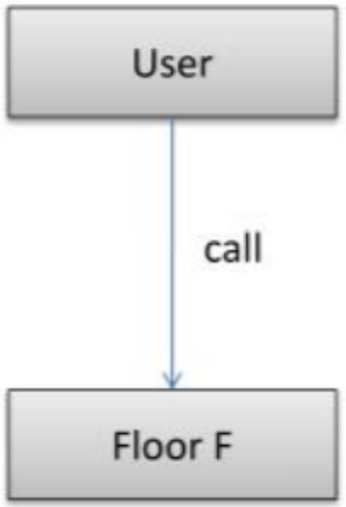
User interaction

- OR the user can be inside the elevator and tells the elevator where he/she wants to go.

General View

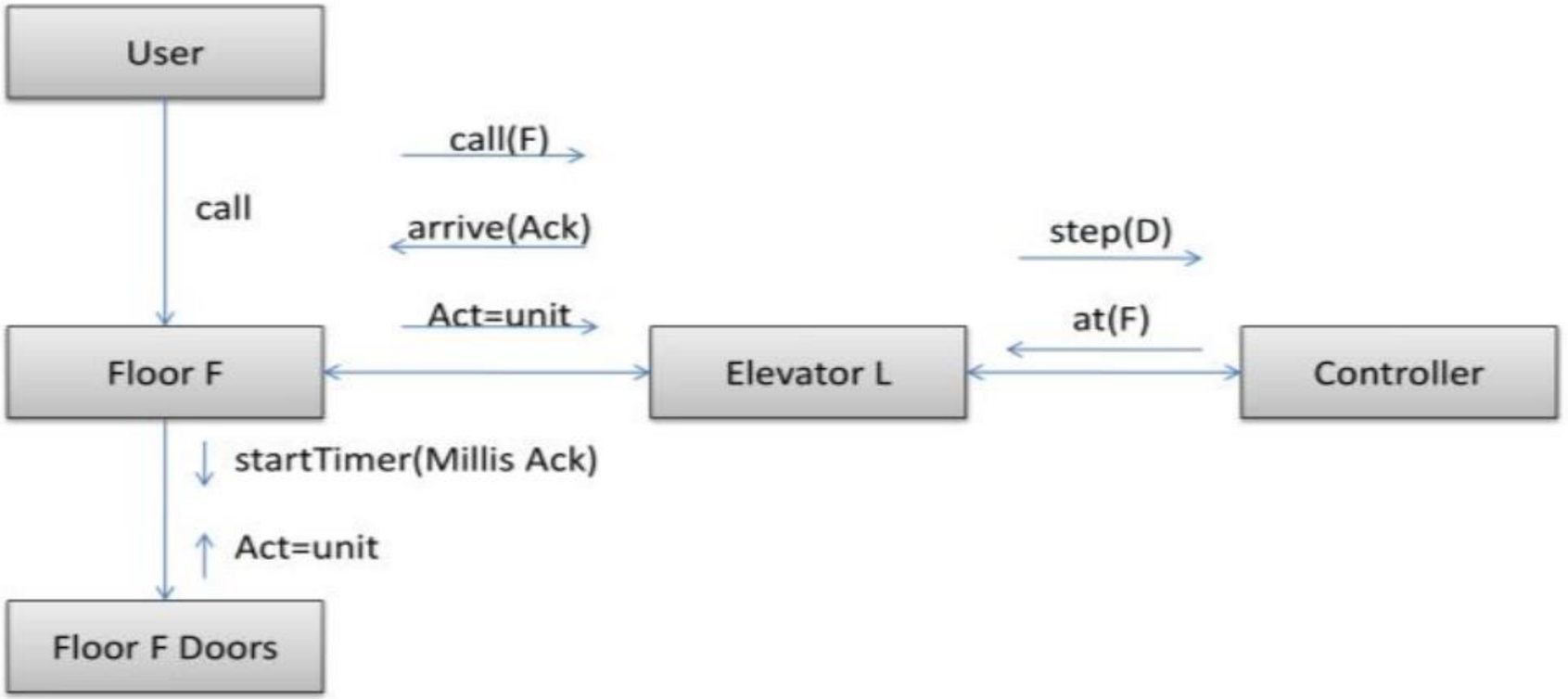


Component View

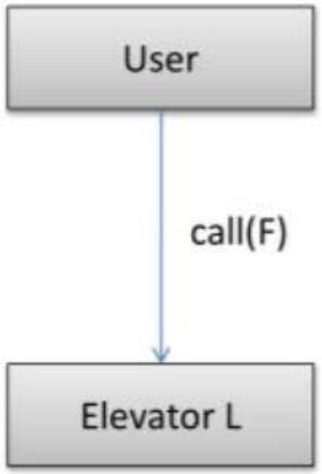


The user in the floor F, presses a button to call the elevator

Component View

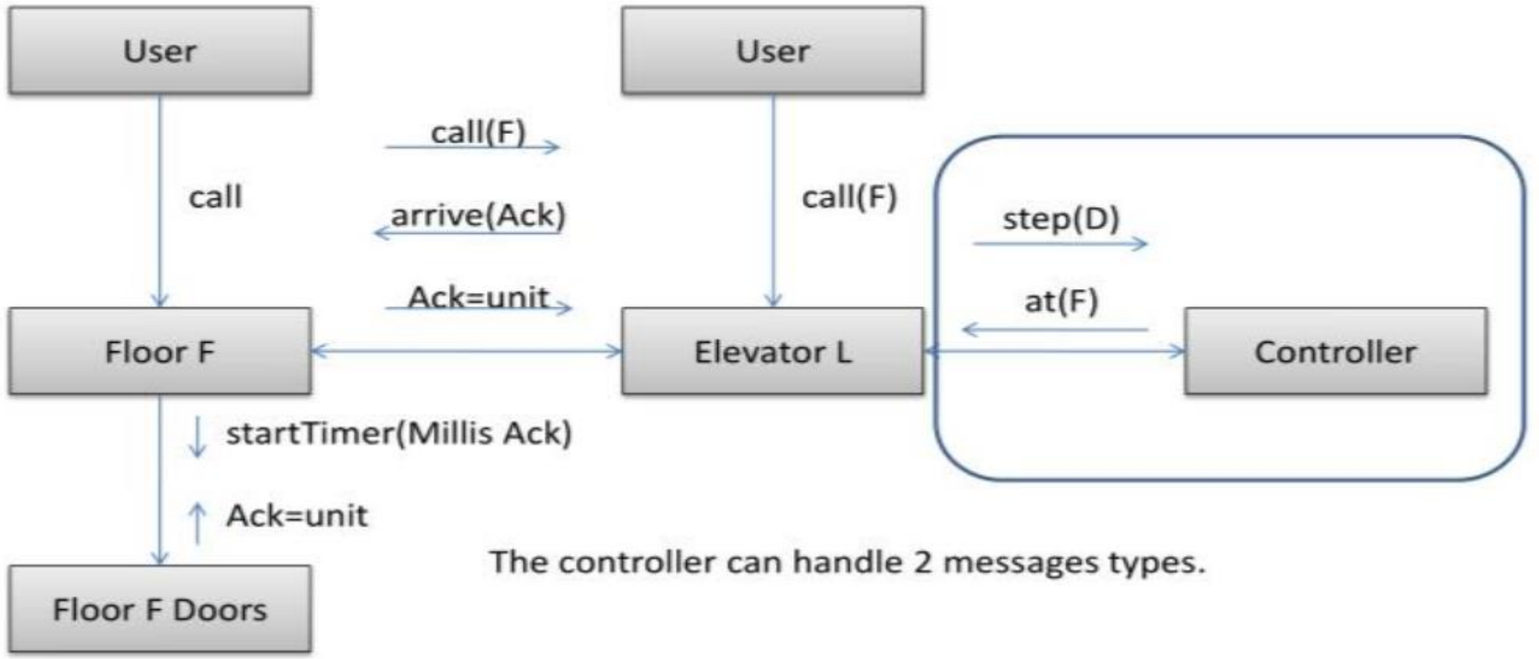


Component View



The user, inside the elevator L, user presses button to go to Floor F

Component View (Complete)



Design of the controller

The controller represents the logic that controls the movement of the elevators through floors.

The operations of the controller are very basic, it can only turn the engines on/off to move the elevator up or down, just one floor each time.

Each time it arrives to a floor, it notifies the Elevator, which decides what to do.

Design of the controller

The controller can send 2 messages:

- starttimer(5000 Tid), tells the engines to turn on during 5 seconds.
- at(F) tells the elevator the current location its current location.

Which are the possible states of the controller? Answer: 2

- The controller has the engines turned on
- The controller has the engines turned off

Design of the controller

In our design the controller can receive 2 messages:

- stoptimer: when the engines has been turned off
- step(Dest): when the elevator wants to go towards a floor

What should we do in each case?

Each controller must know the current floor (in real life, through a sensor), and the Elevator related to the controller.

Design of Floor (1)

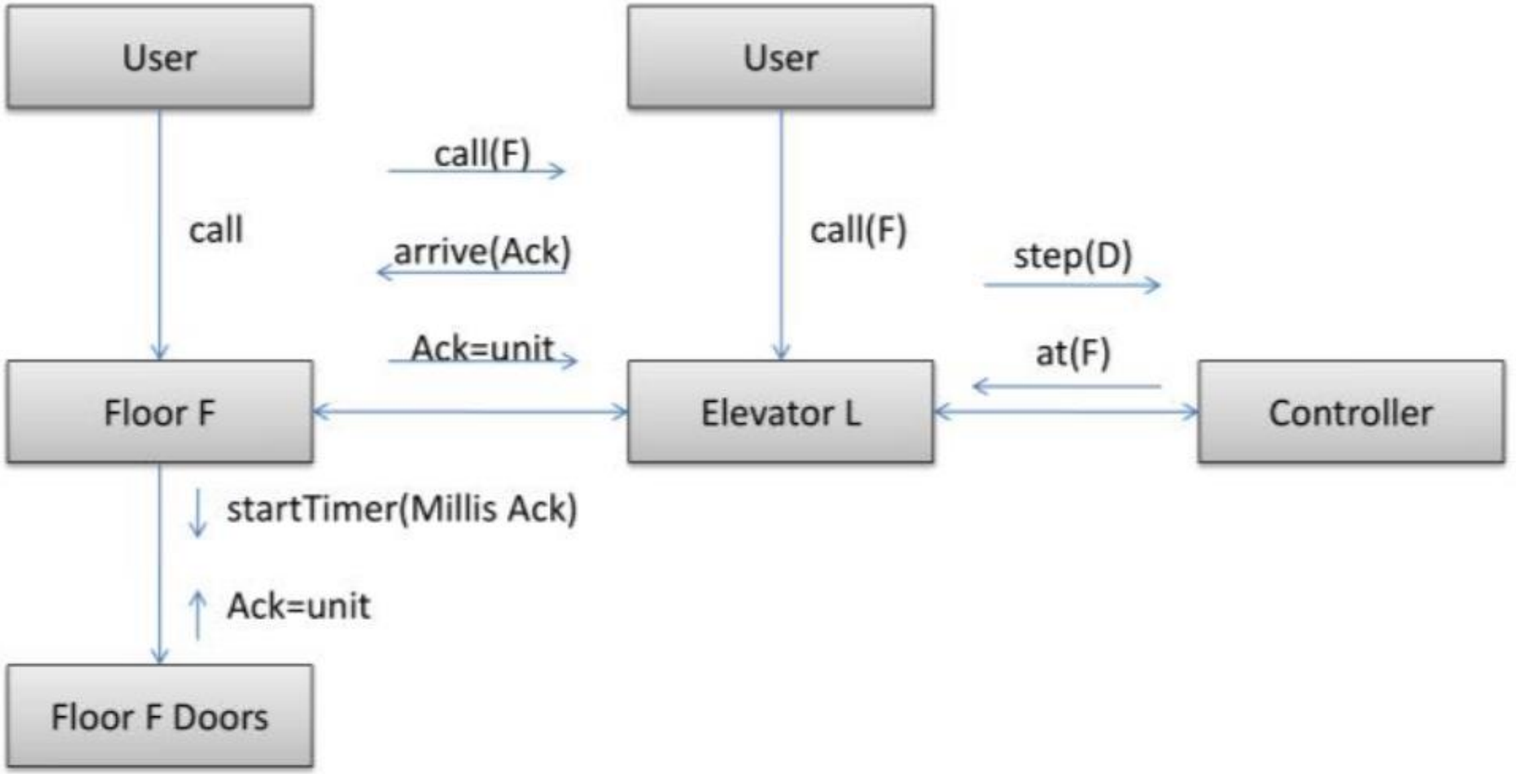
The floor have can receive 2 message types, but it can have 3 internal states:

- Doors operating (opening and closing)
- Doing nothing at all
- Handling a the call of a User

The messages that the floor can receive are:

- arrive(Ack): an elevator has arrive. The Floor must open the doors, and then notify through Ack=unit
- call: is received when the User wants that an elevator goes to the current floor.
- stoptimer: when the doors have been opened (and closed)

Component View (Complete)



Introduction

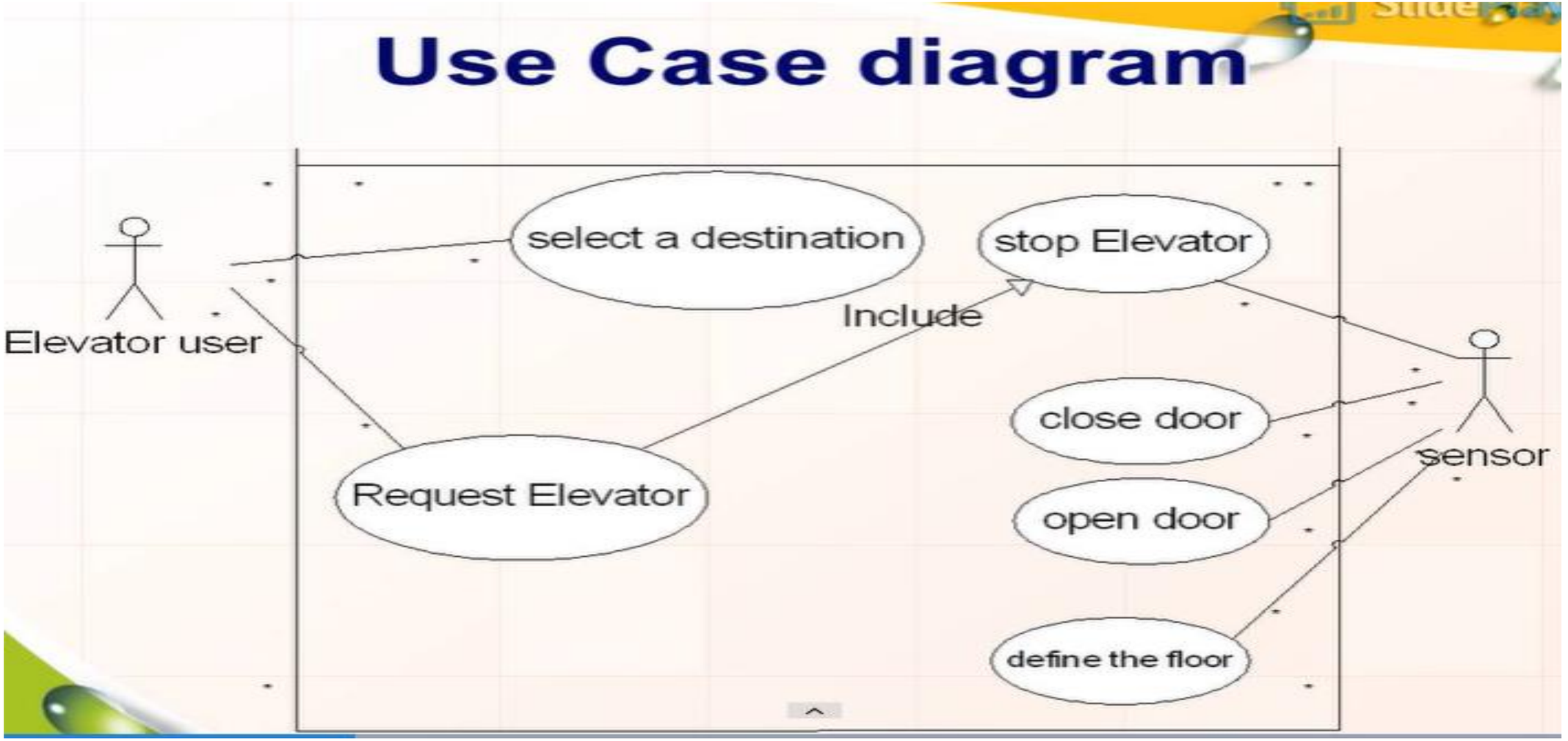
- Divide the elevators to the terms of use and types of:
  1 - Elevators public and commercial purposes
  2 - Elevators residential buildings
  3 - Elevator government departments
  4 - elevators stores

System Requirement

- We can describe the ideal elevators, including the following:

1 - a short wait for the vehicle is up to the decks quickly
2 - comfortable acceleration of the vehicle
3 - loading or unloading at any floor quickly and easily
4 - open and close the doors fast and safe
5 - automatic and stand properly in the floor level
6 - Ease in the arrest and the conduct of the vehicle
7 - All mechanical equipment operating smoothly and without fuss
8 - easy to call the vehicle decks

Use Case diagram



- Use Case name: Select Destination
- Summary: The user in the elevator presses an up or down elevator button to select a destination floor to which move
- Actor: Elevator User (primary), Arrival Sensor
- Precondition: User in the elevator
- Description:

1. User presses an elevator button to go up. The elevator button sensor sends the elevator button request to the system, identifying the destination floor the user wishes to visit.
2. The new request is added to the list of floors to visit. If the elevator is stationary, The system determines in which direction the system should move in order to service the next request. The system commands the elevator door to close. When the door has closed, the system commands the motor to start moving the elevator, either up or down.
3. As the elevator moves between floors, the arrival sensor detects that the elevator is approaching a floor and notifies the system.

- Postcondition: Elevator has arrived at the destination floor selected by the user.

- Use Case name: Stop Elevator at Floor
- Actor: Arrival Sensor
- Precondition: Elevator is moving
- Description:

1- As the elevator moves between floors, the arrival sensor detects that the elevator is approaching a floor and notifies the system. The system checks whether the elevator should stop at this floor. If so, the system commands the motor to stop. When the elevator has stopped, the system commands the elevator door to open.

- Postcondition: Elevator has stopped at floor, with door open.

Safety in Elevator Control System

protection system of the sudden fall!

- Here are aware of the speed, where quickly increase significantly and the sensors are very familiar with the difference in speed .
- through the brake installed on the cabin pressure on the same shaft located on both sides of the cabin, which increase the friction and decrease speed gradually until the elevator stops for fall

- It can also protect from the problem of sudden fall through spring is at the bottom of the hole for the elevator , The benefit of this spring when the sudden fall of the place is not high.

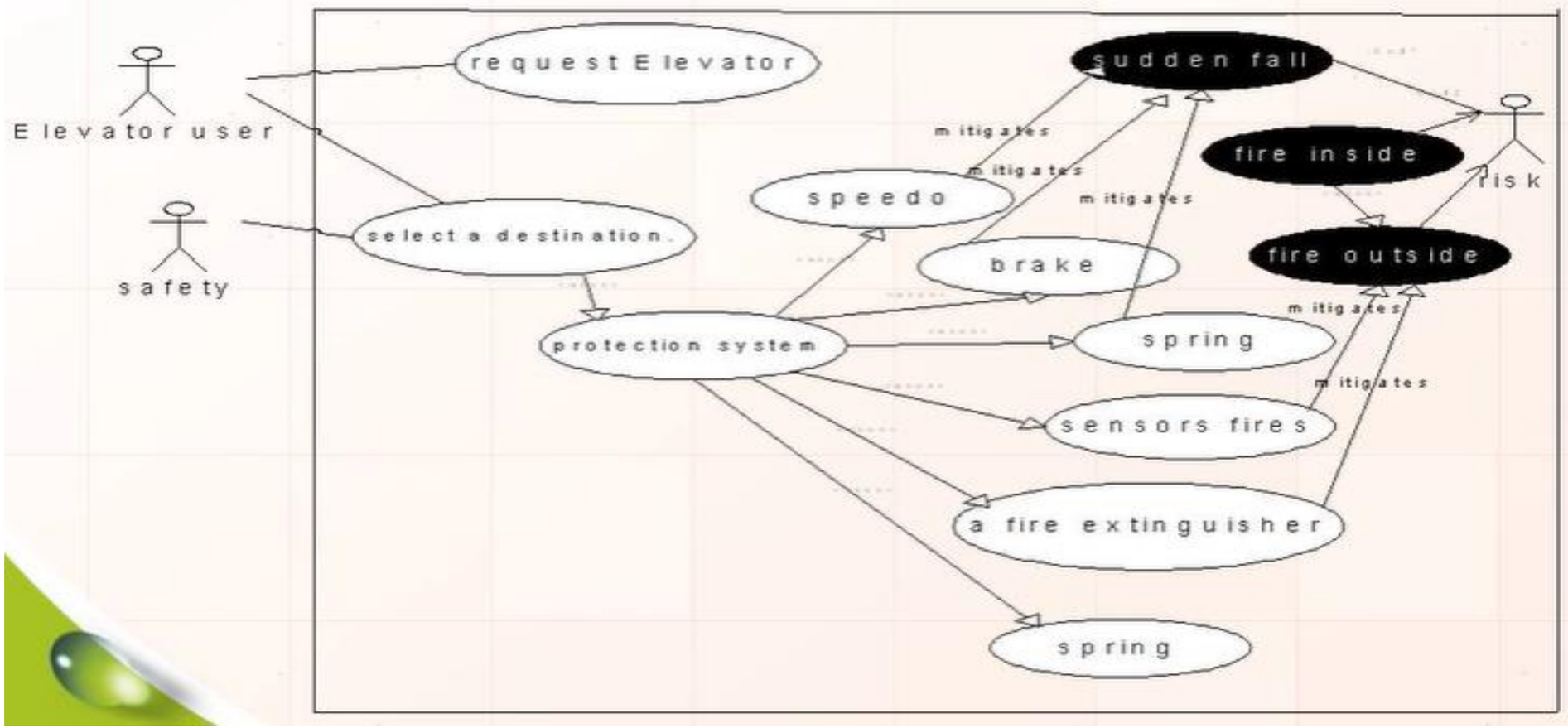
- The problem of fire

fire and here is divided into two parts!

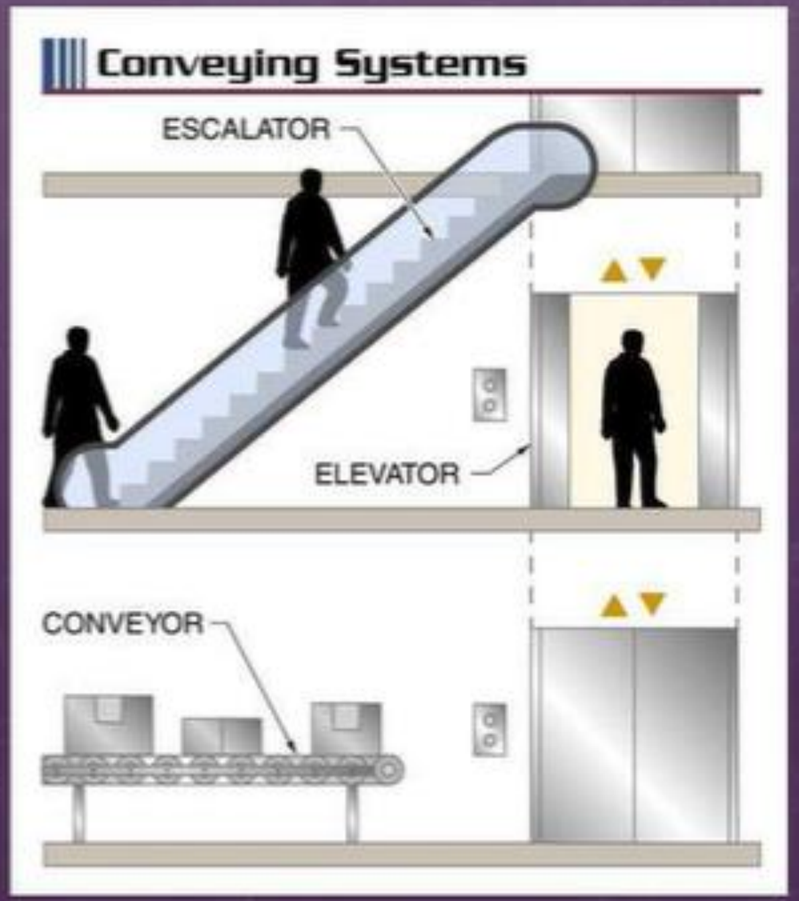
1) fire inside the cabin itself.
2) fire outside the cabin (in the room devoted to the path of the cabin or in the control room and motor).

- Are identified through the fire sensors fires (smoke).
- There is a fire extinguisher, automatic top of the cabin you work if there is a fire inside.
- also be a fire extinguisher handy passengers can use in the event of a malfunction in the automatic extinguisher.
- can use a mechanism for fire extinguishers in the space allocated to the path of the elevator.
- And also use automatic extinguishers in the control room and motor.

Miss use case



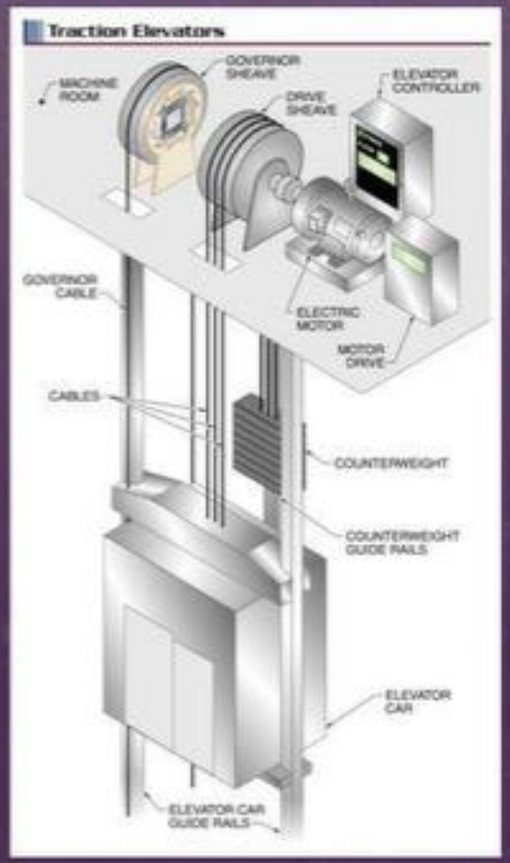
Conveying systems include systems to automatically transport people and/or materials between areas of a building.



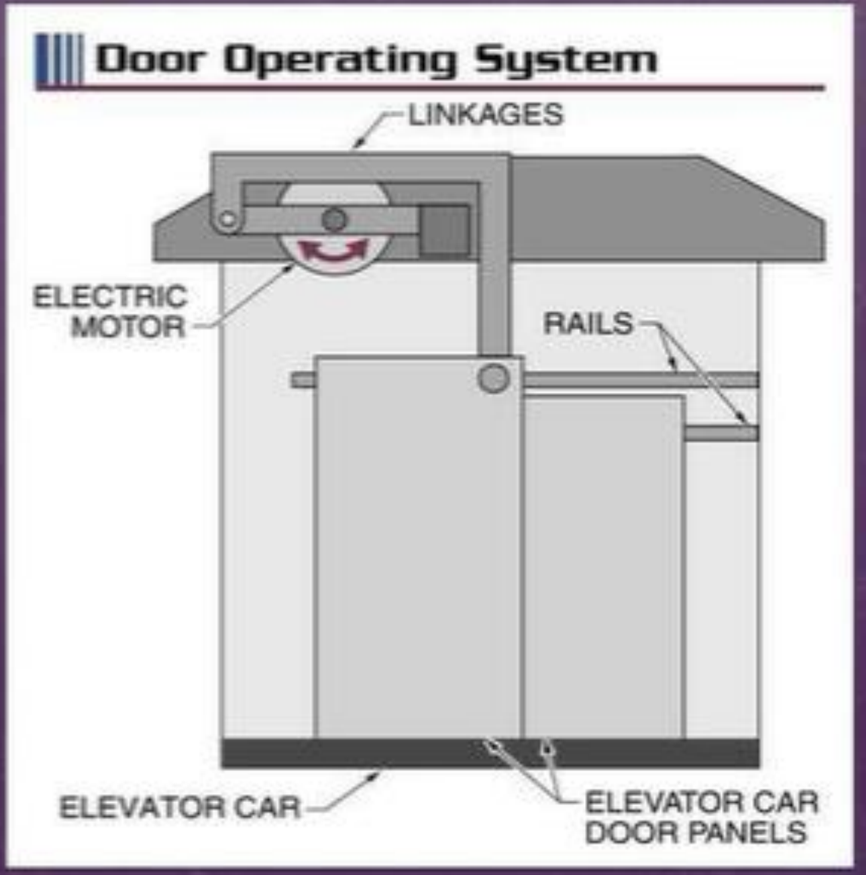
OUTLINE

While passenger elevators are the most common type of elevator, other types of elevators are specifically designed for other functions.

Traction elevators are raised and lowered through the elevator shaft by cables operated by electric motors.

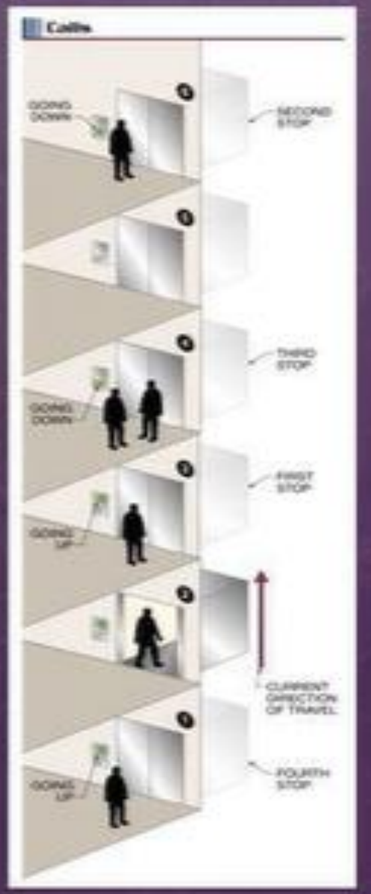


When the elevator car is in the correct position, the door operating system unlocks and pulls open both the car doors and the elevator shaft doors.



The elevator system can respond to signals from other building systems to add calls, control access, and change elevator operating modes.

The normal operating algorithm of an elevator system determines the best sequence of stops in order to minimize passengers' waiting time.



Elevators can be used to control access to certain areas of a building by either controlling the access to the elevator or controlling where the elevator can stop.

Telephones or similar two-way communication devices are installed inside elevator cars for emergencies.

THANK YOU